



Abdominal Transplant Anesthesia Fellowship: A Blossoming Specialty

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Abdominal organ transplantation has witnessed sustained growth over the past three decades. With the advent of machine preservation and xenotransplantation on the horizon, anesthesiologists have become increasingly significant members of the transplant team. The critical role of anesthesia, beginning with an initial evaluation of the transplant candidate, has long been recognized. However, increasing complexity, acuity, and the performance of multiorgan transplant procedures have led to implementation of abdominal transplant anesthesia fellowship programs. Historically, anesthesiologists enter liver transplant practice following accredited fellowships, including critical care or cardiothoracic. These subspecialties offer limited preparation in the care of this complex group of patients and thus are not equivalent to a fellowship that focuses on transplantation (*Semin Cardiothorac Vasc Anesth* 2017;21:352-6). The requirement for specialized training in transplant anesthesia is now recognized by United Network for Organ Sharing/Organ Procurement and Transplantation Network (UNOS/OPTN) bylaw (Appendix F.5) and the ASA Committee on Transplant Anesthesia as one of the training pathways and experience required to serve as a director of a liver transplant anesthesia program (asamonitor.pub/42QdYIP; asamonitor.pub/42inTab).

There is evolving evidence-based practice demonstrating that patient outcomes are influenced by the experience of the anesthesiologist in the field of transplantation (*Liver Transpl* 2009;15:460-5). Recognition of the expanding role of the anesthesiologist in the perioperative care of transplant patients was an early stimulus for the formation of a specialist society solely dedicated to the field of organ transplantation, the Society for the Advancement of Transplant Anesthesia (SATA). SATA is a multiorgan (thoracic and abdominal) transplant society composed of both national and international members (*Semin Cardiothorac Vasc Anesth* 2017;21:352-6). While liver transplantation is recognized as a complex procedure performed on critically ill patients, practical experience managing kidney/pancreas transplantation cases is also often limited during anesthesia residency (*Semin Cardiothorac Vasc Anesth* 2019;23:399-408; *Semin Cardiothorac Vasc Anesth* 2022;26:15-26).



SATA assembled a multicenter task force and developed core competencies and milestones for fellowship training in abdominal transplant anesthesiology specific to liver, kidney, and pancreas transplantation (*Semin Cardiothorac Vasc Anesth* 2019;23:399-408; *Semin Cardiothorac Vasc Anesth* 2022;26:15-26). This serves to promote the anesthesia transplant fellowship as a specialty encompassing all abdominal organs. Trainees at the end of a one-year fellowship should participate in the care of at least 50 liver and 25 kidney transplant patients (*Semin Cardiothorac Vasc Anesth* 2019;23:399-408; *Semin Cardiothorac Vasc Anesth* 2022;26:15-26). To date, there are more than 250 transplant centers in the United States, with around 20 centers offering abdominal transplant anesthesia training, a non-ACGME-accredited fellowship. More information regarding the fellowship programs can be found on the SATA website (asamonitor.pub/31W0TZD; asamonitor.pub/3NU1NGI).

One of the benefits of a non-ACGME accredited fellowship is flexibility in program design. Educational curricula can be modified to suit the needs of the individual while maintaining standards administered by the graduate medical education committee of each institution. With multidisciplinary team interaction and real-time experience in perioperative transplant care – such as coagulation management, transesophageal echocardiography combined with rotations in transplant critical care, blood bank and organ procurement organization – fellows can expect to leave training self-assured that they will become the future leaders in the field of transplantation. Additionally, fellowship training in abdominal transplant anesthesia engages the trainee in the care of high-acuity vascular and hepatobiliary surgery. All fellowship programs not only provide training in the perioperative care of the transplant patient, but also include a part-time opportunity as junior faculty for U.S. residency graduates. In addition, there are a few programs that also accept international medical

graduates. At this time, at the end of fellowship, a board exam is not required; however, training can serve as a good preparation for the basic perioperative TEE board exam.

Based on a recent survey in 2021 by Kraus et al., only 41% of U.S. anesthesia residents will pursue a fellowship upon graduation (*ASA Monitor* 2022;86:31-3). The reasons for choosing a fellowship include: interest in a subspecialty, desire to deepen knowledge in a particular field, further development of clinical skills, and competitiveness for future employment. Among the anesthesia fellowships, abdominal transplant fellowships are just entering the landscape. Several factors may be impeding the widespread recognition of these fellowship opportunities. First, transplantation is currently not a requirement for residency program accreditation or candidate certification in anesthesiology. Second, few anesthesia residency programs are associated with transplant centers. Additionally, residency programs associated with a transplant center and a transplant anesthesia fellowship program may not require a transplant rotation. Lack of exposure to abdominal transplantation during training, in general, likely affects resident interest in transplant anesthesiology. Residency programs affiliated with transplant centers could enhance interest by offering a transplant rotation to internal as well as external trainees. A structured transplant rotation of at least four weeks during the CA-2 or early CA-3 year would create an opportunity for residents to opt for a career in transplant anesthesia as opposed to an elective rotation at the end of residency training. However, the unpredictable nature of a liver transplant procedure and potential disruption of resident schedules deter most residency programs from requiring a dedicated transplant rotation. As an alternative, many programs prefer an advanced anesthesia rotation that includes complex hepatobiliary, oncology, and vascular procedures.

Fellowship-trained transplant anesthesiologists are in great demand at transplant centers across the U.S., even though many abdominal transplant anesthesia fellowship programs do not fill their positions. Unfortunately, this trend has resulted in a limited number of fellowship-trained anesthesiologists available to meet the increasing demand of transplantation centers. Only 55% (11 out of 20) of abdominal transplant anesthesia fellowship programs

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filled their positions in 2020-2021. Most programs report variation in additional fellowship training undertaken by the team members primarily composed of cardiothoracic anesthesia (55%), critical care (46%), and transplant anesthesia (29%) (*Clin Transplant* 2022;36:e14504). Team members with fellowship training in transplant anesthesia were more common in high (>100 transplants/year) versus medium/low (<100 transplants/year) volume programs (45% vs. 20-22%) (*Clin Transplant* 2022;36:e14504). High-volume programs were more likely to offer fellowship training specific to liver transplant anesthesia than low-volume programs (36% vs. 9%) (*Clin Transplant* 2022;36:e14504). Additional TEE training by two-thirds of team members appeared more common in high-volume centers (*Clin Transplant* 2022;36:e14504). Regarding the workload, calls appear to be distributed equally among transplant anesthesia physicians in most of the study centers (83% [69%-92%]) (*Liver Transpl* 2012;18:737-43). The method of compensation for this additional work varied among the centers. More than 75% (60%-86%) of the programs used incentives to compensate anesthesiologists for transplant call availability (*Liver Transpl* 2012;18:737-43). These were either direct financial reimbursements or reductions in other work duties, further incentivizing this career choice (*Liver Transpl* 2012;18:737-43).

In conclusion, the increasing complexity and the rapidly expanding number of patients requiring organ transplantation have created a strong demand for fellowship-trained transplant anesthesiologists where compensation matched the demand. We recommend that residents consider a fellowship in transplant anesthesia and request that faculty encourage interested residents to explore the possibility of a career in the field of anesthesia for organ transplantation. ■